REMARKS

In response to the Official Action mailed September 13, 2002, Applicants amend their application and request reconsideration. In this Amendment, no claims are cancelled and claim 12 is added so that claims 1-12 are now pending.

Some minor amendments to improve the form of parts of the specification are made. No new matter is added.

In this Amendment claim 10, a method claim, is rewritten by incorporating parts of claim 1 rather than referring to claim 1 as in examined claim 10. Claim 12 is added by dividing claim 8 into two parts, not by introducing a new claim.

The invention concerns an axial flow electrical machine, such as a motor, in which the magnetic flux passes along lines parallel to the machine shaft. The machine shaft has, attached to it, a disk-shaped rotor that comprises a fiber- or fabric-reinforced plastic in which permanent magnets are embedded. The structure of this rotor is described in more detail in amended claim 1 and in examined claim 1. That amended claim describes the permanent magnets as being embedded within the plastic and joined at least peripherally to the plastic. This arrangement is described in the patent application by referring to the permanent magnets as having a "positive fit" with the plastic. See, for example, the patent application at page 3, lines 1-5, page 7, lines 5-7, and page 8, lines 21-23.

The way in which the rotor is made is particularly instructive in understanding the structure of the rotor. As described in the paragraph beginning at page 7, line 32, of the patent application the machine shaft and the permanent magnets are placed in a mold into which the heated reinforced plastic is injected under pressure. The mold is completely filled with the result that at least the peripheral edges of the magnets are brought into intimate contact with and joined to the plastic. Potentially, all surfaces of the permanent magnet are covered by the plastic. The result is the "positive fit" between the plastic and the permanent magnets described in the patent application. This structure and the corresponding method are distinct from the references applied by the Examiner in rejecting the claims.

As an assistance to the Examiner, attached is a translation of the International Preliminary Examination Report for the parent PCT patent application. The Examiner issuing the report from the Swiss Patent Office concluded that the "positive fit" arrangement of the permanent magnets in the plastic clearly distinguished the invention from the same prior art applied by the U.S. Examiner. Although the term "positive fit" did not appear in the examined claims and does not appear in the claims now, the language included in amended claims 1 and 10 clearly describes that positive fit.

Claims 1, 2, and 5-9 were rejected as anticipated by Sakai (U.S. Patent 5,619,087). This rejection is respectfully traversed.

In comparing Sakai to the claimed invention, the Examiner asserted that Sakai describes a rotor having permanent magnets embedded in a fiber-reinforced resin. This statement is incorrect. What Sakai describes is an arrangement in which rotor disks have a large number of permanent magnets attached to the rotor disks. In the first described embodiment, the rotor disk is not even plastic as in the invention. See Sakai at column 4, lines 53-55. That metallic rotor includes holes into which the magnets are inserted. See also column 5, lines 45-49 of Sakai. In another described embodiment, Sakai mentions that the rotor can be made of a non-magnetic material such as a fiber-reinforced resin. See Sakai at column 8, lines 47-52. In that embodiment, the permanent magnets "are attached" to each of the rotor disks. See column 8, line 17 of Sakai. This arrangement is clearly different from the arrangement in the invention, particularly as described in amended claim 1, in which the permanent magnets are surrounded by, joined to, and embedded in the resin. Even when Sakai uses that word "embedded" he clearly uses it in a different way from its use in claim 1. "In the present embodiment, the groups 30a of permanent magnets 30(a) constituting the field system are embedded in *the surfaces* of the rotor disks 39-1....". Sakai at column 9, lines 11-13. Further, the same embodiment is described in column 9, lines 29-31 of Sakai as being "embedded in a plurality of holes... made in the surface of each of the rotor disks....". It is apparent that the magnets are only attached to the surface of the rotor disks, quite different from the "positive fit" described in detail in amended claim 1. Sakai does not describe "the positive fit" of the present invention in which the permanent magnets are molded into the resin, thereby resulting in the peripheral joining and embedding of the permanent magnets in the resin. The balance of Sakai includes no different disclosure or suggestion. See, for example, column 11, lines 48 and 49 where "embedded" again means the insertion of elements within holes or recesses made in advance.

To anticipate a claim, a reference must disclose every element of the claim. Sakai fails to describe the embedded permanent magnets in the resin of the rotor as described in amended claim 1 and in all other pending claims. Thus, no claim can be properly rejected as anticipated by Sakai.

Claim 3 was rejected as unpatentable over Sakai in view of Raybould (U.S. Patent 3,558,950). Claim 4 was rejected over the same combination and further in view of Fujita et al. (U.S. Patent 4,093,897, hereafter Fujita). It is apparent that these rejections depend solely upon the rejection for anticipation of claim 1. Since that rejection cannot be properly maintained, the rejections of claims 3 and 4 also fail and must be withdrawn.

The Examiner stated with regard to claims 10 and 11 that no patentable weight was given to the method of manufacturing the rotor, dismissing these claims as product-by-process

claims. Claims 10 and 11 are not product-by-process claims. They are process claims. Claim 10 is an independent claim and claim 11 is a dependent claim. These claims were process claims at the time they were examined. Claim 10 only incorporated, by reference, language of claim 1 for purposes of brevity. The preambles of both claims 10 and 11 make clear that those claims are method claims. Thus, the rules for examining product-by-process claims are not applicable to claims 10 and 11. Instead, those claims must be examined on their own merits. It is apparent that the references applied in rejecting claims 1-9 do not disclose the method of claims 10 and 11 and therefore those claims are clearly patentable over those references. Careful and complete examination of all pending claims is respectfully requested. If the claims have not yet been examined on their merits, then any new Action, not allowing those claims should not be a final rejection.

Since, for the foregoing reasons, all claims now pending are clearly patentable, reconsideration and allowance of claims 1-12 are earnestly solicited.

Respectfully submitted,

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

KNORZER et al.

Application No. 10/009,636 Art Unit: 2834

Filed: December 14, 2001 Examiner: I. Mohandesi

For: ELECTRIC AXIAL FLOW MACHINE

AMENDMENTS TO SPECIFICATION AND CLAIMS MADE IN RESPONSE TO OFFICE ACTION DATED SEPTEMBER 13, 2002

Amendments to the paragraph beginning at page 1, line 7:

An electric axial flow machine is understood as meaning a motor or generator with a rotor and a stator, in which the magnetic flux between the rotor and the stator ~~takes place~~ is parallel to the axis of rotation of the rotor. Axial flow machines of this type are also known by the designations brushless DC motor, permanent-~~field~~magnet synchronous motor or disk-armature motor.

Amendments to the paragraph beginning at page 6, line 7:

According to the invention, the rotor 1 and the machine shaft 2 form a dimensionally stable unit. The ironless disk-shaped rotor 1 has eight permanent magnets 11, which are circumferentially arranged, in a ~~circular manner~~ circle, around the machine shaft 2 and are embedded in the fiber-reinforced plastic 12. The fiber-reinforced plastic 12 extends between the permanent magnets 11, altogether over between approximately 15% and 20% of the circle, to be precise, in ~~such a way that~~ uniform webs ~~are formed~~. In this way, there is sufficient fiber-reinforced plastic 12 between the mechanically very rigid permanent magnets 11 for the rotor 1 to be stable, and a rotor 1 with the smallest possible mass moment of inertia is achieved with the greatest economy, in terms of production cost.

Amendments to existing claims:

1. (Twice Amended) An electric axial flow machine including an ironless disk-shaped rotor arranged on a machine shaft and having permanent magnets embedded in a fiber- or fabric-reinforced plastic, and, on both sides, next to the rotor, a stator, wherein the permanent magnets are each ~~to~~ embedded in and joined at least peripherally to the ~~surrounding~~ fiber- or fabric-reinforced plastic so that the permanent magnets and the machine shaft~~,~~ form a dimensionally stable unit.

2. (Twice Amended) The electric axial flow machine as claimed in claim 1, wherein the permanent magnets are arranged circumferentially, in a circle, around the machine shaft and the fiber- or fabric-reinforced plastic extends between the permanent magnets over at least 10%~~,~~ of the circle.

3. (Twice Amended) The electric axial flow machine as claimed in claim 1, wherein the rotor has on an outer circumference, or proximate the outer circumference, a stiffening band comprising preimpregnated fibrous material, the rotor becoming thicker with increasing distance from the machine shaft.

7. (Twice Amended) The electric axial flow machine as claimed in claim 1, wherein the stator comprises an annular yoke including slots extending approximately radially, relative to the machine shaft, and through which multi-phase windings pass.

8. (Twice Amended) The electric axial flow machine as claimed in claim 7, wherein ~~one of~~ the permanent magnets ~~and the slots~~ are ~~transposed in~~ obliquely arranged, relative to radii of the machine shaft, along a circumferential direction.

10. (Twice Amended) A method for producing ~~a~~ an ironless disk-shaped rotor for arrangement on a machine shaft of an electric axial flow machine ~~as claimed in claim 1, wherein~~ and having permanent magnets embedded in a fiber- or fabric-reinforced plastic, including placing the machine shaft and the permanent magnets ~~are arranged~~ in a mold, heating the mold, and injecting a pre-heated fiber- or fabric-reinforced plastic ~~is subsequently poured~~ under pressure into the heated mold~~, which is heated~~ to embed the permanent magnets in the fiber- or fabric-reinforced plastic.

11. (Twice Amended) The method as claimed in claim 10, including ~~pouring~~ injecting the fiber- or fabric-reinforced plastic at a temperature of at least 200°C and under a pressure of 500 - 1500 bar.